38.(Amended) A spectroscopic method for determining the oxygenation of a biological material, comprising:

irradiating a sample of a biological material with radiation to produce fluorescence from the sample, wherein the fluorescence is modulated by attenuation of the sample;

monitoring a first portion of the modulated fluorescence at a first distance from the sample;

Q15

monitoring a second portion of the modulated fluorescence at a second distance from the sample, the second distance being different from the first distance;

comparing the first and second portions of the modulated fluorescence to each other to determine the attenuation of the sample; and

determining oxygenation of the sample using the attenuation of the sample.

40.(Amended) A spectroscopic method for determining the concentration of hemoglobin in a biological material, comprising:

irradiating a sample of a biological material with radiation to produce fluorescence from the sample, wherein the fluorescence is modulated by attenuation of the sample;

Q16

monitoring a first portion of the modulated fluorescence at a first distance from the sample;

monitoring a second portion of the modulated fluorescence at a second distance from the sample, the second distance being different from the first distance;

comparing the first and second portions of the modulated fluorescence to each other to determine the attenuation of the sample; and

A16 (concluded)

determining the concentration of hemoglobin in the sample using the attenuation of the sample.

42.(Amended) A method for determining a physiological characteristic of a biological material, comprising:

A17

irradiating a sample of a biological material with radiation to produce fluorescence from the sample, wherein the fluorescence is modulated by the sample;

monitoring a first portion of the modulated fluorescence at a first distance from the sample;

monitoring a second portion of the modulated fluorescence at a second distance from the sample, the second distance being different from the first distance; and

comparing the first and second portions of the modulated fluorescence to each other, using a predictive model, to determine a physiological characteristic of the sample.

44.(Amended) A method for determining a physiological characteristic of a biological material, comprising:

A18

irradiating a sample of a biological material with radiation to produce fluorescence from the sample, wherein the fluorescence is modulated by the sample;

monitoring a first portion of the modulated fluorescence at a first distance from the sample;

monitoring a second portion of the modulated fluorescence at a second distance from the sample, the second distance being different from the first distance;

comparing the first and second portions of the modulated fluorescence to each other to determine a modulation characteristic of the sample; and

A18 (concluded)

processing the modulation characteristic, using a predictive model, to determine a physiological characteristic of the sample.

46.(Amended) Apparatus for analyzing a sample, comprising:

a source adapted to emit radiation that is directed at a sample to produce fluorescence from the sample, wherein the fluorescence is modulated by the sample;

A19

a first sensor adapted to monitor the fluorescence at a first distance from the sample and generate a first signal indicative of the intensity of the fluorescence;

a second sensor adapted to monitor the fluorescence at a second distance from the sample and generate a second signal indicative of the intensity of the fluorescence, the second distance being different from the first distance; and

a processor associated with the first sensor and the second sensor and adapted to compare the first and second signals to each other to determine a modulation characteristic of the sample.

48.(Amended) Apparatus for analyzing a sample, comprising:

a source adapted to emit radiation that is directed at a sample volume in a sample to produce fluorescence from the sample, such fluorescence including modulated fluorescence resulting from modulation by the sample;

A20

a first sensor adapted to monitor the fluorescence at a first distance from the sample volume and generate a first signal indicative of the intensity of the fluorescence;

a second sensor adapted to monitor the fluorescence at a second distance from the sample volume and generate a second signal indicative of the intensity of the fluorescence, the second distance being different from the first distance; and

a processor associated with the first sensor and the second sensor and adapted to compare the first and second signals to each other to determine a modulation characteristic of the sample.

49.(Amended) Apparatus for determining a modulation characteristic of a biological material, comprising:

A20 (continued)

a source adapted to emit excitation light;

a first waveguide disposed at a first distance from the sample adapted to transmit the excitation light from the light source to the biological material to cause the biological material to produce fluorescence, and adapted to collect a first portion of the fluorescence;

a first sensor, associated with the first waveguide, adapted to measure the intensity of the first portion of the fluorescence and generate a first signal indicative of the intensity of the first portion of the fluorescence;

a second waveguide disposed at a second distance from the sample adapted to collect a second portion of the fluorescence, the second distance being different from the first distance;

a second sensor, associated with the second waveguide, adapted to measure the intensity of the second portion of the fluorescence and generate a second signal indicative of the intensity of the second portion of the fluorescence; and

a processor adapted to compare the first and second signals to each other to determine a modulation characteristic of the biological material.

50.(Amended) Apparatus for analyzing a sample, comprising:

a source adapted to emit radiation that is directed at a sample volume in a sample to produce fluorescence from the sample, such fluorescence including modulated fluorescence resulting from modulation by the sample;

a first sensor, displaced by a first distance from the sample volume adapted to monitor the fluorescence and generate a first signal indicative of the intensity of the fluorescence; [and]

a second sensor, displaced by a second distance from the sample volume adapted to monitor the fluorescence and generate a second signal indicative of the intensity of fluorescence, the second distance being different from the first distance; and

a processor associated with the first sensor and the second sensor and adapted to compare the first and second signals to each other to determine a physiological property of the sample.

51.(Amended) Apparatus for determining a physiological property of a biological material, comprising:

a source adapted to emit excitation light;

a first waveguide disposed at a first distance from the sample, and adapted to transmit the excitation light from the light source to the biological material to cause the biological material to produce fluorescence, and further adapted to collect a first portion of the fluorescence;

a first sensor, associated with the first waveguide, for measuring the intensity of the first portion of the fluorescence and generating a first signal representative of the intensity of the first portion;

a second waveguide disposed at a second distance from the sample, and adapted to collect a second portion of the fluorescence, the second distance being different from the first distance;

a second sensor, associated with the first waveguide, for measuring the intensity of the second portion of the fluorescence and generating a second signal representative of the intensity of the second portion; and

a processor adapted to compare the first and second signals to each other to determine a physiological property of the biological material.

52.(Amended) A spectroscopic method of analyzing a sample, comprising:

irradiating a sample with radiation to produce fluorescence from the sample, wherein the fluorescence is modulated by the sample;

monitoring a first portion of the modulated fluorescence at a first distance from the sample;

monitoring a second portion of the modulated fluorescence at a second distance from the sample, the second distance being different from the first distance;

comparing the first and second portions of the modulated fluorescence to each other to determine a modulation characteristic of the sample;

wherein the sample is a biological tissue [material];

wherein the method further includes determining a physiological property of the tissue using the modulation characteristic; and

wherein the physiological property of the tissue is ischemia.

53.(Amended) A method for determining a physiological characteristic of a biological material, comprising:

irradiating a sample of a biological material with radiation to produce fluorescence from the sample, wherein the fluorescence is modulated by the sample;

monitoring a first portion of the modulated fluorescence at a first distance from the sample;

monitoring a second portion of the modulated fluorescence at a second distance from the sample, the second distance being different from the first distance; and

comparing the first and second portions of the modulated fluorescence to each other, using a predictive model, to determine a physiological characteristic of the sample[;],

wherein the predictive model is multivariate.

54.(Amended) A spectroscopic method of analyzing a sample, comprising:

irradiating a sample with radiation to produce fluorescence from the sample, wherein the fluorescence is modulated by the sample;

monitoring a first portion of the modulated fluorescence at a first angle from the sample;

monitoring a second portion of the modulated fluorescence at a second angle from the sample; and

comparing the first and second portions of the modulated fluorescence to each other to determine a modulation characteristic of the sample.